

A.

AMENDMENTS TO THE CLAIMS

Claims 1-53 (canceled)

54. (new) A method of forming metal protuberances on an insulating substrate having exposed wettable, metallic contact pads, the method comprising:

applying at least one layer of a composition comprising gold powder in an organic vehicle on each of the metallic contact pads without overlapping the pads;

drying the composition containing the gold powder in an organic vehicle;

heating the insulating substrate to a temperature sufficient to destroy the organic vehicle;

heating the insulating substrate to a temperature above the melting point of gold,

whereupon the gold powder melts, forming rounded gold bumps on the contact pads, and

cooling the gold bumps, the gold bumps being capable of being metallurgically bonded to an electronic device.

55. (new) A method according to claim 54, wherein a plurality of gold powder composition layers are applied to deposit enough gold to form protuberances of a predetermined height.

56. (new) A method according to claim 54, further comprising metallurgically bonding at least one electronic device to the gold bumps on the insulating substrate.

57. (new) A method according to claim 56, wherein the gold bumps are bonded to the electronic device by a process selected from the group consisting of thermocompression and thermal ultrasonic bonding processes.

58. (new) A method according to claim 57, wherein the electronic device being metallurgically bonded to the gold bumps of the insulating substrate is selected from a group consisting of active components, passive components, semiconductor dice and electromechanical devices.

59. (new) A method according to claim 58, wherein at least one miniature electromechanical system (MEMS) is metallurgically bonded to the gold bumps of the insulating substrate.

60. (new) A method according to claim 54, wherein the insulating substrate is heated in a reducing atmosphere to a temperature sufficient to destroy the organic vehicle.

61. (new) A method according to claim 54, wherein the insulating substrate is heated in a reducing atmosphere to a temperature above the melting point of gold.

62. (new) A method of forming metal protuberances on an insulating substrate having exposed wettable, metallic contact pads, the method comprising:

depositing a metal on each of the metallic contact pads without overlapping the pads;
melting the metal, whereupon melting, the metal forms shapes of convex metal protuberances on the metallic contact pads, the metal of the metal protuberances being capable of being joined to the contacts of at least one electronic device by a welding technique.

63. (new) In the method according to claim 62, wherein the metals are deposited by a means selected from a group consisting of plating, vacuum deposition, sputtering, electroplating, electroless deposition, depositing powdered metal particles, depositing metal films, depositing metal wires and depositing metal foils.

64. (new) A method according to claim 63, wherein the metal is deposited by printing a paste of a metal powder in an organic vehicle; drying the metal paste deposits; heating the metal paste deposits at a temperature sufficient to destroy the organic vehicle, melting the metal deposits, whereupon melting, the metal deposits form shapes of convex metal protuberances on the metallic contact pads, and then cooling the metal protuberances.

65. (new) A method according to claim 64, wherein the metal of the metal powder comprises a metal selected from a group consisting of copper, gold and silver.

66. (new) A method for making a connection to contacts of an electronic device comprising:

providing an insulating base having a conductive pattern, the conductive pattern having contact areas wettable by a molten metal;

depositing metal over the contact areas of the insulating base, the metal being deposited over the wettable contact areas without overlapping the wettable contact areas;

melting the metal, the molten metal forming metal protuberances on the contact areas of the insulating base;

cooling the metal protuberances, and
metallurgically bonding the metal protuberances to the contacts of the electronic device.

67. (new) The method of claim 66, wherein the metal protuberances are metallurgically bonded to the electronic device by a welding technique.

68. (new) The method of claim 67, wherein the welding technique is selected from a group consisting of thermocompression bonding, ultrasonic bonding and thermal ultrasonic bonding.

69. (new) The method of claim 66, where the contact pads of at least one electronic device selected from a group consisting of active components, passive components, semiconductor dice and electromechanical devices are metallurgically bonded to the metal protuberances of the insulating base.

70. (new) The method of claim 69, wherein the contact pads of at least one miniature electromechanical system (MEMS) are metallurgically bonded to the metal protuberances of the insulating substrate.

71. (new) The method of claim 66, wherein the metal being deposited is selected from a group consisting of aluminum, copper, gold, silver and alloys comprising these metals.